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**Selenium Distribution in Tadpoles from a Fly Ash Settling Basin**

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Beamline(s): X26A

**Introduction:** Studies conducted at the D area coal fly ash basins at the Savannah River Site have documented physiological and morphological abnormalities in fish, amphibians, and reptiles inhabiting the ash basin area. Studies of tadpoles (*Rana catesbeiana*) collected from the ash basins have shown that there is a higher incidence of deformities in mouth structures (Rowe et al. 1996, 1998) and in axial malformations of tail structures when compared to tadpoles collected from a reference site (Hopkins et al. 2000). Total trace element concentrations invariably show significantly increased concentrations of Se, As, Cr, Cd, and Sr in impacted animals taken from the ash basin when compared to those collected from reference sites (Hopkins et al., 1998, 2001). In this study we have employed Synchrotron-XRF to study the elemental distribution of contaminants in mouthparts of tadpoles collected from the ash basin. The mouthparts studied had visible malformations and were compared with elemental distributions in a 'reference' tadpole.

**Methods and Materials**: Tadpoles were collected from the D-area ash basins at the Savannah River Site Aiken, SC. They were stored frozen prior to sectioning of the mouthparts, which were mounted on Kapton tape for presentation to the beamline. The samples were mapped in 2D at beamline X26A using a 0.010 mm focused monochromatic X-ray beam at energy just above the Se Kα binding energy. Six tadpoles of varying degrees of visual malformation and one reference animal were examined using this technique.

**Results**: We found that all impacted tadpoles exhibited a localized concentration of Se in the malformed area, while such localization of Se was absent from the reference animals. Localized areas of Se accumulation appear highly correlated with Zn (Figure 1); however, localized high concentrations of Zn were also observed in the reference animal. We are currently investigating the theory that Se substitutes for S in keratin proteins, possibly disrupting S-S bridging and thus protein structure and function.

**References**

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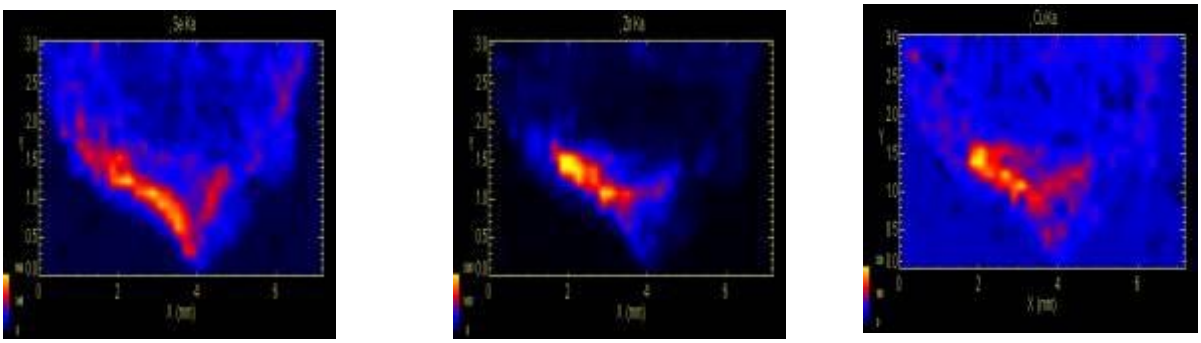

Figure 1: Synchrotron XRF mapping of Tadpole mouth-parts, elemental maps are (from the left) Se, Zn, and Cu